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# PATENT SPECIFICATION

DRAWINGS ATTACHED

1,185,648

Inventor: CURT HILDESHEIMER

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## COMPLETE SPECIFICATION

### Method of Forming an Image

We, RANK XEROX LIMITED, of Rank Xerox House, 338 Euston Road, London, N.W.1., a British company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a method of forming an image.

The invention is applicable for example, for use in electrophotographic copying machines wherein paper sheets are successively fed one at a time from a stack of sheets, each sheet being brought into contact with the surface of an electrophotographic plate bearing a developed electrostatic latent image and then transported away from the electrophotographic plate to a fixing station at which the image which has been transferred to the paper sheet is fixed on the sheet. However, the invention is not restricted to paper sheets for use in such electrophotographic copying machines and sheets according to the invention may also be utilized in other types of electrophotographic copying machines or printing machines using non-electrophotographic techniques.

Difficulty has been experienced on all sheet feeders for feeding paper which are smaller in size than that specified for the feeder or for the electrophotographic machine or copying machine or printing machine to which this feeder is attached. The members and parts used in the feeder and the attached machine are arranged for a given minimum size of sheet to be fed and smaller sheets are not under proper control in feeding or printing.

The present invention provides a method of forming an image on an image-receiving sheet comprising attaching said image-receiving sheet to the carrier sheet of a duplex sheet, said duplex sheet comprising a carrier sheet and a backing sheet secured to each other at least along one edge, at least two slots being provided in said carrier sheet and said carrier sheet being larger than said image-receiving sheet,

the attachment of said image-receiving sheet to said carrier sheet being effected by engagement of portions of said image-receiving sheet in said slots with a major portion of said image-receiving sheet located on the opposite side of said carrier sheet from said backing sheet, passing said image-receiving sheet through an imaging operation to produce an image thereon while said image-receiving sheet is attached to said carrier sheet.

One embodiment of the invention will be described with reference to the accompanying drawings wherein:—

Fig. 1 is a sectional view of a duplex sheet;

Fig. 2 is a plan view of the sheet of Fig. 1;

Fig. 3 is a plan view of a modified duplex sheet carrying two image-receiving sheets;

Fig. 4 is an inverted plan view of part of the sheet of Fig. 1 carrying an image-receiving sheet;

Fig. 5 shows a xerographic machine with which the sheet of Fig. 1 may be used;

Fig. 6 schematically illustrates in section elements of the machine of Fig. 5.

Fig. 1 shows a duplex sheet 1, comprising a top carrier sheet 2 and a bottom backing sheet 3 as shown in Fig. 1 which is in face to face relationship with said carrier sheet and is secured to said carrier sheet along one edge thereof by an adhesive layer 4. The top carrier sheet is provided with four slots 5 as shown in Fig. 2 and these slots serve to hold the image-receiving sheet, i.e. actual sheet to be printed upon, during the feeding and printing cycle. Depending upon the weight and size of the image-receiving sheet two, three or four slots 5 may be used and the length and positioning of the slots may be varied as required by the sheet to be printed on. As shown in Fig. 3, a similar type of duplex sheet may be provided with two sets of slots so that it can carry two or more sheets to be printed on during the feeding and printing cycle. Fig. 3 illustrates the appearance of the outer face

of a carrier sheet 2 when it carries two image-receiving sheets 6. Fig. 4 illustrates the appearance of the inner face of a carrier sheet 2 carrying a single image-receiving sheet (for example a data card); this inner face is normally covered by backing sheet 3. There is no special limitation to the size of the image-receiving sheet to be printed on but normally it will be smaller than the minimum sheet size specified for said feeder or printing machine. The sheet to be printed on is however smaller than the carrier sheet 2.

It is found that such a duplex sheet can be successfully used to carry an image-receiving sheet during the feeding and printing cycle of conventional copying machines, assuming that the carrier sheet 2 is of a size suitable for the sheet feeder of the copying machine. The slots 5 in the carrier sheet 2 hold the image-receiving sheet 6 securely and enable the sheet feeder satisfactorily to separate the duplex sheet 1 from the stack. The bottom sheet 3 prevents the corners 7 of the sheet to be printed on which protrude through the slots 5 in the carrier sheet 2 (as shown in Fig. 4) from catching or binding and the duplex sheet 1 is reliably forwarded to the copying station. At the copying station an image such as a visible powder image is formed on the image-receiving sheet or sheets 6 held in the slots of the carrier sheet 2 and in the case of a powder image is thereafter fused. The duplex sheet 1 is then delivered from the copying machine and the image-receiving sheet or sheets 6 are removed from the slots of the carrier sheet. The duplex sheet 1 may be used several times in succession before it is discarded.

In order that the carrier sheet 2 and backing sheet 3 may serve their purpose of holding the image-receiving sheet during the feeding and printing operation it is essential that the two sheets be secured together in such manner that they do not separate during the feeding operation. As previously noted the sheets should be secured together along at least one edge. Where the sheets are secured at only one edge, this edge will normally be the leading edge of the duplex sheet 1 during the feeding operation. It is also possible to secure the sheets at two opposite edges thereof. It may even be desirable to secure the backing sheet 3 to the carrier sheet 2 around the whole periphery thereof or even to effect releasable adherence between the backing sheet and the carrier sheet over selected areas of the copy sheet.

For many purposes it is convenient to have the backing sheet 3 and the carrier sheet 2 of the same size but this is not essential. However, it is usually desirable to have the carrier sheet 2 at least as large as the backing sheet 3.

For reasons of economy the manner of securing the backing sheet 3 to the carrier sheet 2 generally involves some kind of adhesive

technique. However, it will be realized that other types of securing sheets together for example by stitching, stapling or crimping, may be feasible provided that the securing technique adopted does not interfere with the satisfactory operation of the sheet feeding or other function of the copying machine on which the sheets are intended to be used.

Referring to Figs. 5 and 6 of the drawings, a copying machine shown generally at 10 includes an original document 12 placed face down thereon whose downwardly facing image is scanned by a suitable scanning means 14. The scanned image is progressively transferred to the surface of a rotating intermediate or drum member 16 which has been previously electrostatically charged by a mechanism shown generally at 18. Thereafter, the latent electrostatic image on the rotating drum 16 corresponding to the document image is subjected to a developing mechanism shown generally at 20. The mechanism 20 includes an endless conveyor means 22 which disperses the fusible toner material 24 over the surface of the drum. The fusible material adheres to the areas of the drum corresponding to the image on the original document 12. There after, feeding means (not shown) acting in cooperation with a pair of register rollers 30 sequentially advance duplex sheets 28, similar to those shown in Figs. 1 to 4 and carrying image-receiving sheets 6 such as data cards, 28 from a supply stack 26. The size of the image-receiving sheets 6 is such as to accommodate the image of the original document 12. The feeding of each of the individual sheets 28 is timed and oriented relative to the image on the surface of the rotating drum 16 and the location of the image-receiving sheets on the duplex sheets 28 is arranged to be in register with the original document 12. Each sheet 28 passes between the transfer mechanism 32 and the surface of the drum whereby the image from the drum is transposed to the surface of the image-receiving sheets 6 carried by sheets 28. The sheets 28 containing the fusible material thereon in the pattern of the image on the original document is subsequently conveyed by the horizontal transport system 34 below a fuser means 36. The heated material 24 is thus permanently joined with the image-receiving sheet 6. Although the fuser shown is of the heat type, it is understood that the image may be fused by heat, vapor, pressure or any other suitable fusing means or any combination thereof.

The fuser means 36 as shown raises the temperature of the duplex sheet 28 and material, thereon to a relatively high temperature. Machines of this general type require a relatively thick copy-receiving member to prevent undue warping and buckling. In addition, because the entire copying process involves the use of an intermediate image transfer member such as the drum 16, it is necessary that an accurate

preregistered and timed feeding of the copy-receiving member be maintained relative to the image scanning means 14 operating on the document. This may be contrasted with the usual photographic copying means wherein the copy-receiving member is placed in direct contact with the document and therefore no accurate timed feeding of the sheet is required.

After the image has been fused to the image-receiving member 6 it travels upwardly through the feed rollers and transport system 40 to be collected in the delivery hopper 41. Additional means shown generally at 38 are provided to clean the rotating drum 16 and remove all residuary fusible material therefrom prior to re-charging by means 18. A more detailed description of the basic copying mechanism is not believed required for the purposes of understanding this invention. However, a machine of this general type is described in United States Patent No. 3,062,095 and reference may be made thereto for a fuller comprehension of the operating details thereof.

There is no special limitation to the weight or size of the image-receiving sheet 6 and cardboard sheets such as data cards (punched cards) for computers are easily inserted into the slots of the carrier sheet 2 and fed on the automatic feeder. There is a limitation as to the size of the copy which may be transferred from the original to the sheet 6 as two or more corners of said smaller sheet pass through the slots of the carrier sheet 2 and are thus obscured.

There is no special limitation as to the weight and thickness of the carrier sheet 2 and backing sheet 3 as long as the total weight and thickness of these two sheets taken with those of the sheet or sheets 6 do not surpass the admissible weight or thickness of copy-receiving members for the feeder or copying machine. The weight of the backing sheet 3 may, for example, be between 40 and 100 grams per square meter and the weight of the carrier sheet 2 is preferably not less than 80 grams so that the slots will not be cut or broken by the insertion and removal of the sheets 6. This allows the duplex sheet, as previously stated, to be used several times in succession. The insertion of the sheet or sheets 6 and their

removal after the printing are done by hand.

The weights of paper quoted above are merely those used in a particular embodiment.

It will be appreciated that the present invention provides a method of producing an image on a sheet or several sheets smaller than the size of sheet which could otherwise be fed or printed on a copying or printing machine.

#### WHAT WE CLAIM IS:—

1. A method of forming an image on an image-receiving sheet comprising attaching said image-receiving sheet to the carrier sheet of a duplex sheet, said duplex sheet comprising a carrier sheet and a backing sheet secured to each other at least along one edge, at least two slots being provided in said carrier sheet and said carrier sheet being larger than said image-receiving sheet, the attachment of said image-receiving sheet to said carrier sheet being effected by engagement of portions of said image-receiving sheet in said slots with a major portion of said image-receiving sheet located on the opposite side of said carrier sheet from said backing sheet, passing said image-receiving sheet through an imaging operation to produce an image thereon while said image-receiving sheet is attached to said carrier sheet.

2. The method of claim 1 wherein carrier sheet has at least one group of four slots therein for receiving the four corners of said image-receiving sheet.

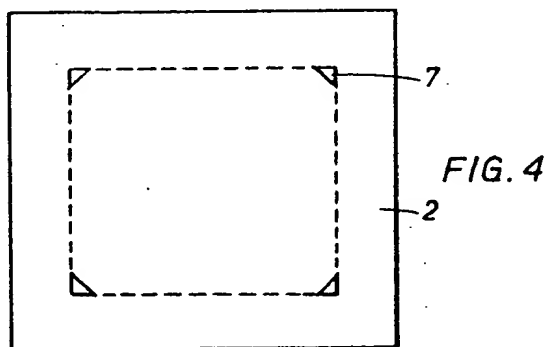
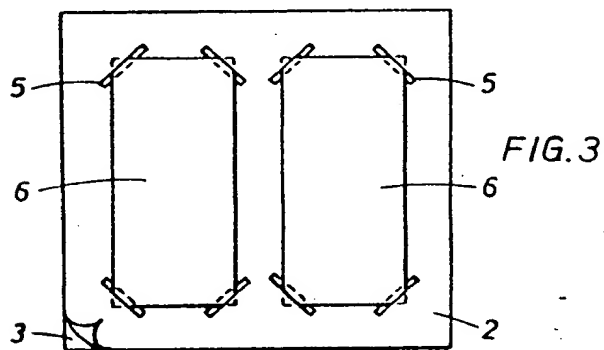
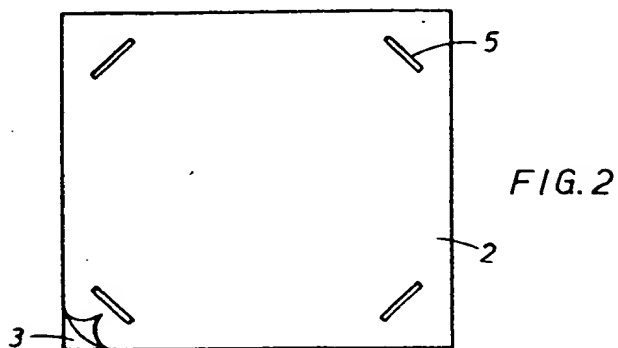
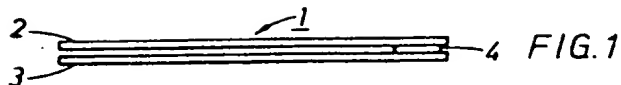
3. The method of claim 2 wherein said carrier sheet has two groups of four slots therein for attachment of two image-receiving sheets thereto.

4. The method of any of claims 1 to 3 wherein said carrier sheet and said backing sheet are of the same size.

5. The method of any of claims 1 to 4 wherein said imaging operation comprises transfer of a powder image to said image-receiving sheet and fusion of said powder image on said image-receiving sheet.

6. The method of claim 1 substantially as herein described.

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COMPLETE SPECIFICATION

2 SHEETS

*This drawing is a reproduction of  
the Original on a reduced scale*

Sheet 2

